

Answers to EXAMPLE 3. HYPOTHETICAL – NEW NATURAL GAS BOILER (235 MMBTU/HR)

TOOLS:

Emissions Factors (EF) from AP-42, Section 1.4-2:

Pollutant	Emissions Factor (lb/MMSCF NG)*
PM	7.6
SO ₂	0.6
Pb	0.0005
NO _x	100
VOC	5.5
CO	8.4
Greenhouse Gases	
CO ₂	117.6 lb/MMBtu
CH ₄	0.00225 lb/MMBtu
N ₂ O	0.00216 lb/MMBtu

PROBLEM SOLVING:

Question 1: What would the emissions be for the proposed project?

Example Calculation:

PM₁₀ Emissions [tons/yr] =

(90 MMBtu/hr) * (1 MMSCF/1020 MMBtu) * (7.6 lb/MMSCF) * (8760 hr/yr) * 1 ton/2000 lb = **2.93 tons/yr**

CO₂ Emissions [tons/yr] =

(1304 MMBtu/hr) * (213.4 lb/MMBtu) * (8760 hrs/yr) * (0.0005 ton/lb) = 1218838

Calculations

Calculated Total Emissions from 235 MMBtu/hr NG Boiler (Tons/Year):								
PM ₁₀	SO ₂	NO _x	VOC	CO		CO ₂	CH ₄	N ₂ O
7.66	0.61	100.87	5.56	84.40		121,045	2.32	2.22

Question 2: On a mass basis, what are the total emissions of GHGs?

CO₂+CH₄+N₂O = Total Emissions of GHG's (on a mass basis, tpy)

= 121,050 tons/year

Question 3: What are the total emissions of CO_{2e}?

Step 1: Refer to Global Warming Potential (GWP) Table (Title 40, Part 98, Subpart A, Table A-1)

Step 2: Identify pollutants and their respective GWPs.

Pollutant	Global Warming Potential
CO ₂	1
CH ₄	21
N ₂ O	310

$$CO_{2e}(tpy) = \sum (GWP_i \times MassEmissionRate_i(tpy))$$

$$CO_{2e}(tpy) \text{ Example} = (\text{mass } CO_2 * 1) + (\text{mass } CH_4 * 21) + (\text{mass } N_2O * 310) =$$

121,783 tons/yr

Calculations [tons/yr] =

Question 4: So, we have

GHGs(mass)	CO _{2e}
121050	121783

APPLICABILITY ANALYSIS:

Question 1: Does this action require a Title V permit (e.g. any pollutant > 100 tpy)?

Question 2: Does the permit action have GHG emissions in excess of thresholds?

≥0 tpy mass GHG emissions	Yes	No
≥100 tpy mass GHG emissions	Yes	No
≥ 75,000 tpy CO _{2e}	Yes	No
≥100,000 CO _{2e} emissions	Yes	No

Question 3: Does the permit action require a PSD analysis?

>100 tpy listed major source (ARM 17.8.801)	Yes	No
>250 tpy non-listed major source	Yes	No

What are the facility's permit requirements?

If the Permit Decision occurs before 1/2/2011: GHG's do not need to be considered

Step 1: If the permit decision occurs between 1/2/2011 and 7/1/2011:

PSD

The Facility would be considered a non-listed source and the emissions of regulated pollutants are less than 250 TPY, so this facility does not trigger a PSD action for non-GHG pollutants and therefore does not trigger PSD action for GHG.

Title V

The facility requires a Title V Operating Permit, "anyway". GHG's must be addressed in the Title V permit. The Title V Operating permit would include applicable requirements for GHGs if there were any. At this time, there are no applicable requirements for GHGs, so the facility would simply need to acknowledge GHGs in the application. The Department would then address GHGs in the Technical Review Document attached to the Operating permit. If the facility is subject to PSD then the facility would also need to include any BACT requirements from the PSD process and associated conditions. EPA hopes to have some guidance on GHG-BACT Analysis soon.

The new facility must submit an application for the Title V Operating Permit by 7/1/2011 or one year after commencing operation—whichever is later (ARM 17.8.1205).

Step 2: If the permit decision occurs after 7/1/2011:

PSD

The facility does not trigger a PSD action for criteria pollutants because they are all less than 250 tpy. However, the GHG emissions exceed 250 tpy and the CO₂e emissions exceed the PSD threshold of 100,000 tpy. Therefore, the facility would be subject to PSD for GHGs. For PSD, the facility must complete a BACT analysis for GHGs. EPA hopes to have some guidance on GHG-BACT Analysis soon.

Title V

The facility requires a Title V Permit anyway (NO_x > 100 tpy), and applicable requirements for GHGs must be included. In this example, the facility would be subject to PSD and therefore must include any applicable requirement as a result of PSD review.

The new facility must submit an application for the Title V Operating Permit by 7/1/2011 or one year after commencing operation—whichever is later (ARM 17.8.1205).